

# Mattole Basin in the Regional Context

## Introduction

Within the context of the North Coast, the Mattole River basin is unique in many ways. The basin receives some of the highest annual rainfall in California. This region also experiences a very high level of seismic activity. Bedrock underlying much of the basin has been tectonically broken and sheared making it relatively weak, easily weathered, and inherently susceptible to landsliding and erosion. The unstable bedrock and soil conditions combined with heavy rainfall, high regional uplift rates, and very active seismicity produce widespread naturally occurring landsliding with associated large volumes of sediment delivered to streams.

The total Mattole Basin resident population for the year 2000 census was approximately 1,200 people. Both Honeydew and Petrolia are two hours driving time south of Eureka, the closest urbanized area. This remoteness has made local residents self-sufficient, independent, and adaptive. Additionally, many local residents have a strong sense of place. Both historic and current land uses are based upon agriculture and forestry. Specific land uses today are centered on relatively small, private non-industrial timber management, cattle and sheep ranching activities, and other agricultural pursuits like orchards, pasture, and field crops.

Fishery resources of the Mattole Basin include fall-run Chinook salmon, coho salmon, summer-run steelhead trout, and winter-run steelhead trout. The salmon and steelhead trout have been traditionally important as food and recreation resources to local residents and visitors.

Based upon commonality of watershed attributes, four subbasins can be distinguished within the context of the Mattole Basin. For the purpose of watershed assessment, these study areas were named the Northern, Eastern, Southern, and Western subbasins. These are in addition to the Estuary, which is a product of the upstream subbasins, but is itself unique. In general, each of the five is somewhat unique from the others, but each has distinguishing attributes that are generally common within the several CalWater 2.2a Planning Watersheds (PWs) contained within the subbasin. The subbasin is a useful assessment scale upon which to conduct analyses of findings, form conclusions, and suggest improvement recommendations.

## Summary of Subbasin Conditions and Recommendations

Based on NCWAP's six assessment questions, salmonid habitat in the Mattole Basin was found to have medium to high potential to serve as refugia for salmon and steelhead trout (Table 165).

Table 165. Subbasin Salmonid Refugia Area Ratings in the Mattole Basin.

| Subbasin          | Refugia Categories: |                |                  |             | Other Categories: |                                     |              |
|-------------------|---------------------|----------------|------------------|-------------|-------------------|-------------------------------------|--------------|
|                   | High Quality        | High Potential | Medium Potential | Low Quality | Non-Anadromous    | Critical Contributing Area/Function | Data Limited |
| Estuary Subbasin  |                     |                | X                |             |                   | X                                   | X            |
| Northern Subbasin |                     |                | X                |             |                   |                                     | X            |
| Eastern Subbasin  |                     |                | X                |             |                   |                                     | X            |
| Southern Subbasin |                     | X              |                  |             |                   |                                     | X            |
| Western Subbasin  |                     |                | X                |             |                   |                                     | X            |

## Salmonid Populations

The NCWAP assessment of salmonid populations found that:

- The Mattole Basin historically supported relatively robust populations of Chinook salmon, coho salmon, and steelhead trout;
- Recent biological stream surveys indicate the presence of Chinook salmon and steelhead trout in all five Mattole subbasins and the presence of coho salmon in the Eastern, Southern, and Western subbasins;
- No studies have been conducted to estimate subbasin or tributary specific population abundance levels of coho salmon or Chinook salmon; however, a nine-year intensive study of three tributaries within the Northern Subbasin indicated stable age classes of steelhead trout;
- Intensive studies of the Estuary Subbasin have shown depressed populations and poor survival of over-summering Chinook salmon and steelhead trout, and no coho have been detected;
- Mattole basin-wide population estimates indicate depressed meta-populations of Chinook and coho salmon.

## Salmonid Habitat

- Instream sedimentation in several stream reaches throughout the basin may be approaching or exceeding levels considered suitable for salmonid populations. Currently, the estuary is very shallow and lacks channel complexity. Conditions in the estuary are thought to be deleterious to salmon and steelhead trout at this time. Erosion/sediment reduction is the top recommendation category for the Eastern and Estuary subbasins;
- High summer water temperatures in many surveyed tributaries are deleterious to summer rearing salmonid populations in the Estuary, Northern, Eastern, and Western subbasins. Riparian/water temperature improvements is the top recommendation category in the Northern Subbasin;
- In general, pool habitat, escape and ambush cover, and water depth are unsuitable for salmonids in many mainstem and tributary stream reaches in the Mattole Basin. In the Southern Subbasin summer flow is inadequate or non-existent in many reaches. Large woody debris recruitment potential is poor in the Northern, Eastern, and Western Subbasins. Instream habitat improvement is the top recommendation category in the Southern and Western subbasins;
- Available data from sampled streams suggest that suitable, high quality spawning gravel for salmonids is limited in some streams in all subbasins;
- Salmonid habitat conditions in the Mattole Basin are generally best in the Southern and Western subbasins, mixed in the Eastern subbasin, and most impacted in the Estuary and Northern subbasins.

Table 166. Summary of Mattole Subbasins Stream and Watershed Conditions and Recommended Action.

|                                     | Estuary Subbasin | Northern Subbasin | Eastern Subbasin | Southern Subbasin | Western Subbasin |
|-------------------------------------|------------------|-------------------|------------------|-------------------|------------------|
| <b>Identified Conditions</b>        |                  |                   |                  |                   |                  |
| In-Stream Sediment                  | -/R              | -/R               | -                | -/R               | -                |
| Water Temperature                   | -                | -                 | ~                | +                 | ~                |
| Pools                               | -                | -                 | -                | ~                 | -                |
| Flow                                | +                | ~                 | ~                | -                 | ~                |
| Escape Cover                        | -                | -                 | -                | -                 | -                |
| Fish Passage Barriers               | +                | ~                 | ~                | ~                 | ~                |
| Natural Sediment Sources            | -                | -                 | ~                | +                 | +                |
| Management-Related Sediment Sources | -                | -                 | +                | -                 | +                |

| <b>Recommended Improvement Activity Focus Areas</b> |          |          |          |          |          |
|---|----------|----------|----------|----------|----------|
| Flow  |          |          |          | <b>X</b> |          |
| Erosion/Sediment                                    |          | <b>X</b> | <b>X</b> | <b>X</b> | <b>X</b> |
| Riparian/Water Temperature                          | <b>X</b> | <b>X</b> | <b>X</b> |          | <b>X</b> |
| Instream Habitat                                    | <b>X</b> | <b>X</b> | <b>X</b> | <b>X</b> | <b>X</b> |
| Gravel/Substrate                                    |          |          | <b>X</b> | <b>X</b> | <b>X</b> |
| Fish Passage Barriers                               |          |          |          | <b>X</b> | <b>X</b> |

- + Condition is favorable for anadromous salmonids  
 - Condition is not favorable for anadromous salmonids  
 ~ Condition is mixed or indeterminate for anadromous salmonids  
**R** Trend indicates improved conditions 1984-2000  
**X** Recommended improvement activity focus areas

## Geology

The NCWAP assessment of geology found that:

- Geologic units within the basin can be grouped into one of three bedrock terrains (hard, moderate, and soft) and one for Quaternary alluvial units. Larger landslides are more prevalent in soft terrain and are typically earthflows, while smaller slides, typically debris slides, are more prevalent in hard and moderate terrains;
- Weak geologic materials, steep slopes, high rainfall, and strong earthquakes common to the basin result in high rates of natural landsliding and surface erosion, particularly in soft terrain. These natural processes can be exacerbated by human land use within the basin. About one half of the basin is considered to have a high to very high landslide potential;
- In general, the subbasins can be ranked in terms of relative impacts with geologically unstable areas linked to adverse stream effects. The Northern Subbasin has the largest proportion of geologically unstable (soft) terrain, which is linked to the highest amount of historically active landslides, gullies, and stream features indicative of excess sediment production, transport and storage. The Southern Subbasin has the lowest proportion of geologically unstable terrain, historically active landslides, gullies, and stream features indicative of excess sediment production and transport. The Eastern and Western subbasins are intermediate between these two extremes due to the variability in the proportion of soft terrain and steep slopes;
- Source and transport reaches of the blue line streams as depicted on NCWAP stream network maps, were identified primarily in bedrock terrains, while response (depositional) reaches were identified in the Quaternary (alluvial) unit reaches. Features indicative of excess sediment production, transport and storage have decreased throughout most of the basin in the period between 1984 and 2000. The reduction in these features was greatest in the hard terrain. The distribution of these features in bedrock terrains suggests that portions of the areas interpreted as having a high to very high landslide potential are also the sources of sediment that has been delivered to streams;
- Human activities such as timberland conversion to grasslands and brush, grazing, timber harvest, and road construction and use, have interacted with natural geologic instability to increase sediment production far above naturally high background levels.

## Vegetation

The NCWAP assessment of vegetation found that:

- Historic timber harvesting and streamside road construction reduced riparian canopy and increased direct sediment inputs and water temperature. Overall, the current landscape is comprised of smaller diameter forest stands than in pre-European times;
- There has been little timber harvesting in the Mattole Basin in the last decade, and it is not likely under current management that intense timber harvest will occur;

- Remaining stands in late seral reserve are fragmented in the basin, and found largely on the public land in the Western and Eastern subbasins;
- A considerable part of the Southern Subbasin is now in State Park or Sanctuary Forest management, and no commercial harvest is planned in the subbasin;
- Large woody debris recruitment potential is currently limited by the low percentage of near-stream forest stands containing trees in large diameter classes, but the situation should improve with the current forest management scenario;
- Decades of fire suppression have created dense forest stands and brush-lands leading to the designation of Mattole Basin population centers as high wildfire threat areas.

## Land Use Impacts

The NCWAP assessment of land use found that:

- Land use, including road construction and use, timber harvesting, and grazing, has added excess sediment to the fluvial system. Many of the effects from these activities are spatially and temporally removed from their upland sources. Excess sediment remains in the Mattole mainstem despite decades of low timber harvesting activity;
- Currently, roads are a major land use contributor of sediment (CDF, 2002). Large storms or other catastrophic events combined with poor road location and construction practices have the potential to deliver large and adverse amounts of sediment into stream systems;
- Water extraction for agriculture, road maintenance, and residential use has the direct effect of reducing the amount of available habitat for fish;
- Grazing is widespread on privately owned grasslands and has shifted to cattle since the enactment of predation protection measures. Stock impacts to streams are not common or widespread, but watercourse exclusionary fencing is limited.

## Limiting Factors Analysis Conclusions

Based on available information for the Mattole Basin, the NCWAP team believes that salmonid populations in general are currently being affected by:

- Impacted estuarine conditions;
- General lack of habitat complexity in many stream reaches;
- High instream sediment levels;
- High summer water temperatures;
- Inadequate flows during summer low flow periods;
- Reduced basin-wide coho and Chinook meta-populations.

## Recommendations:

### *Flow and Water Quality Improvement Activities:*

- Discourage unnecessary and wasteful use of water during summer low flow periods to improve stream surface flows and fish habitat, especially in the Southern Subbasin;
- Increase the use of water storage and catchments systems that collect rainwater in the winter for use in the drier summer season;
- Support local efforts to educate landowners about water storage and catchments systems, and find ways to support and subsidize development of these systems;
- Support and expand ongoing local efforts that monitor summer water and air temperatures on a continuous 24-hour basis to detect long-range trends and short-term effects on the aquatic/riparian community;
- Support the Mattole Salmon Group's efforts to determine the role of sediment in the mainstem Mattole River in elevated estuarine water temperatures.

### ***Erosion and Sediment Delivery Reduction Activities:***

- Reduce sediment deposition to the estuary by supporting a basin-wide road and erosion assessment/control program such as the Mattole Restoration Council's Good Roads, Clear Creeks effort. Continue to conduct and implement road and erosion assessments such as the on-going efforts in the Dry and Westlund planning watersheds in the Eastern Subbasin. Expand road assessment efforts because of the potential for further sediment delivery from active and abandoned roads, many of which are in close proximity to stream channels in the Bridge and Thompson planning watersheds in the Southern Subbasin;
- Establish monitoring stations and train local personnel to track in-channel sediment and aggraded reaches throughout the basin and especially in the North Fork Mattole and the Upper North Fork Mattole rivers, Mattole Canyon, Blue Slide, Squaw, Honeydew, and Bear creeks;
- Consider the nature and extent of naturally occurring unstable geologic terrain, landslides and landslide potential (especially Categories 4 and 5) when planning potential projects in the subbasin;
- At stream bank erosion sites, encourage cooperative efforts to reduce sediment yield to streams. CGS mapping indicates eroding banks are not a significant basin wide issue, but may be of localized importance. They occur in isolated, relatively short reaches distributed throughout the Mattole Basin;
- Based on the high incidence of unstable slopes in the Northern Subbasin, any future sub-division development proposals should be based on an existing county-imposed forty acre minimum parcel sub-division ordinances;
- Encourage the use of appropriate Best Management Practices for all land use and development activities to minimize erosion and sediment delivery to streams. For example, low impact yarding systems should be used in timber harvest operations on steep and unstable slopes to reduce soil compaction, surface disturbance, and resultant sediment yield.

### ***Riparian and Habitat Improvement Activities:***

- Where current canopy is inadequate and site conditions, including geology, are appropriate, initiate tree planting and other vegetation management to hasten the development of denser and more extensive riparian canopy, especially in the Northern Subbasin;
- Landowners and managers in the Northern and Western subbasins should work to add more large organic debris and shelter structures to streams in order to improve channel structure, channel function, habitat complexity, and habitat diversity for salmonids;
- Ensure that stream reaches with high quality habitat in the Mattole Basin are protected from degradation. This is especially important in the Southern Subbasin. The best stream conditions as evaluated by the stream reach EMDS were found in the South Fork of Vanauken Creek, Mill Creek - at Mattole river-mile 56.2 (RM 56.2), Stanley Creek, Thompson Creek, Yew Creek, and Lost Man Creek Tributary in the Southern Subbasin, and in Harrow Creek in the Eastern Subbasin. Refugia investigation criteria, which include biological parameters, indicated Bear Creek was the best stream evaluated in the Mattole Basin.

### ***Supplemental Fish Rescue and Rearing Activities:***

- Since 1982 a successful cooperative salmonid rearing facility in the Mattole headwaters has been operated by the Mattole Salmon Group (MSG) and CDFG. They also operate a Chinook juvenile out-migrant rescue rearing program near the estuary, which released 2,400 coded-wire-tagged Chinook sub-yearlings in October 2002. These programs should be continued as needed to supplement wild populations while the improvements from long-term watershed and stream restoration efforts develop;
- Initiate a systematic program to monitor the effectiveness of fish rescue and rearing activities, and determine the need for the continuance of cooperative, supplemental fish rearing efforts;
- Update as scheduled the MSG / CDFG five-year plan that provides guidance to the cooperative rearing and rescue projects. Base the periodic plan updates on the findings of the effectiveness monitoring program and best available science.
- Education, Research and Monitoring Activities:

- Utilize Humboldt State University studies conducted in the early 1990s as baseline information to periodically monitor trends in estuarine conditions and fish production;
- Encourage ongoing stream inventories and fishery surveys of tributaries throughout the Mattole Basin, especially in the Northern Subbasin;
- In order to protect privacy while developing data, the possibility of training local landowners to survey their own streams and to conduct salmonid population status surveys throughout the basin would be advisable;
- Further study to investigate the affects to water quality from timberland herbicide use is recommended;
- Follow the procedures and guidelines outlined by NCRWQCB to protect water quality from ground applications of pesticides;
- Encourage appropriate chemical transportation and storage practices as well as early spill reporting and clean-up procedures;
- Conduct training as needed and desired to assist landowners, managers, consultants, and other interested parties in the construction and appropriate application of landslide occurrence and potential maps from GIS analysis.

## Propensity for Improvement

### Advantages

The Mattole Basin has several advantages for planning and implementing successful salmonid habitat improvement activities that include:

- An active restoration community made up of many highly skilled and experienced individuals. This community includes the comprehensive Mattole River and Range Partnership. The Partnership is composed of several natural resources agencies, Mattole landowners, and watershed groups like the Mattole Salmon Group and the Mattole Restoration Council. This broad base provides a common forum for different points of view and interests concerning the watershed and fisheries within the basin;
- Skilled fundraisers who are capable of recruiting funds from a myriad of grant programs. Currently, a major grant was secured by members of the Partnership from the Coastal Conservancy for a multi-year general watershed improvement program which includes various activities ranging from education to stream work;
- A skilled workforce with a core of experienced workers. This group of community based technicians provides a resource for ensuring successful projects and building future technical capacity in the basin. The logical long range product of this component is better watershed stewardship on a landscape scale;
- An expanding group of cooperative landowners that includes both public and private landowners from all subbasins in the Mattole. The effect of this growing cooperative land-base is the ability to choose locations for projects where the best result can be achieved in the shortest period of time. This accelerates the overall effectiveness of the watershed improvement program. The current Good Roads, Clear Creeks program is an example of this advantage;
- Several watersheds and streams are now well into recovery and should respond well to continued stewardship and improvement treatments.
- This NCWAP assessment containing findings, conclusions, and recommendations for improvement opportunities. This report provides focus from the basin scale, through the subbasin scale and down to the level of specific tributary assessments. With this tool to focus project design efforts, local landowners and restoration groups can pursue the mutual development of site specific improvement projects on an adaptive basis;
- A core population of Chinook salmon, coho salmon, and steelhead trout as well as summer steelhead unique to the Mattole River system. Although depressed from historic levels there remain local stocks that can take advantage of improved conditions. Over time, barring overwhelming outside

impacts, the stocks should grow in response to watershed efforts. Currently, efforts by the Cooperative Hatchbox and Rescue Rearing Program are augmenting these core populations.

## Challenges

The Mattole Basin also has some challenges confronting efforts to improve watershed and fish habitat conditions, and increase anadromous fish populations:

- Not all landowners are interested in salmonid habitat improvement efforts. Without a watershed wide cooperative land-base, treatment options are limited. In some cases this can remove some key areas from consideration of project development;
- High natural erosion rates will always be a part of the Mattole landscape. These high background erosion thresholds makes the need to reduce human induced erosion rates to as close to zero as possible an imperative;
- Summer and early fall water resources are very limited in some very important parts of the basin, particularly the Southern Subbasin. The very good instream habitat conditions in that subbasin are of no use to fish without water in the streams. As human water use intensifies, the loss of critical fish stocks will continue and compromise other fishery improvement efforts.
- The risk of pollutant spills also becomes problematic with increases in near stream residential and agricultural development and occupation.
- Even if needed watershed improvement efforts succeed in reducing sediment yield to basin streams, the estuary will be slow respond. The scale of the problem and the nature of low gradient, depositional reaches to move sediment slowly cause this situation. Therefore, containing the erosion that exceeds natural background levels will affect estuarine habitat improvements only over a very long period of time. That means basin wide sediment reduction efforts will have to be sustained with a great deal of patience for a very long time, in fact, in perpetuity. Meanwhile, salmonid stocks impacted by the harsh estuarine conditions will have to be protected and perhaps rescued until conditions improve. Fish rescue is a very difficult and risky task and can be problematic itself.
- Chinook and coho salmon and summer steelhead meta-populations are currently reduced to levels that could impact the amount of needed straying of colonizing fish into improved or expanded habitat conditions. Without a high degree of habitat seeding from strays, meta-population increases are compromised and the desired response to improvement efforts are slowed, successes masked, and evaluation difficult.

## Conclusion

The likelihood that any North Coast basin will react in a responsive manner to management improvements and restoration efforts is a function of existing watershed conditions. In addition, the status of processes influencing watershed conditions will affect the success of watershed improvement activities. A good knowledge base of these current watershed conditions and processes is essential for successful watershed improvement. Acquiring this knowledge requires property access. Access is also needed to design, implement, monitor, and evaluate suitable improvement projects. This systematic process is dependent upon the cooperative attitude of resource agencies, watershed groups and individuals, and landowners and managers.

The Mattole NCWAP assessment has considered a great deal of available information regarding watershed conditions and processes in the Mattole Basin. This long assessment and analysis has identified problems and made recommendations to address these problems while considering the advantages and challenges of conducting watershed improvement programs in the Mattole Basin.

After considering these problems, recommendations, advantages and challenges, the Mattole Basin appears to be a very good candidate for a successful long term programmatic watershed improvement effort. According to the current NCWAP refugia analysis, the Mattole Basin has medium to high potential to become a high quality refugia habitat basin. Reaching this goal is dependent upon the formation of a well organized and thoughtful improvement program founded on a broad based community commitment to active watershed stewardship. The energy and opportunity appears to be present here, and well underway in many parts of the basin. If these efforts are pursued vigorously and patiently, one day the Mattole could

once again be known as “clear waters” and be home to both a healthy fishery resource and a healthy watershed-based community in a uniquely diverse and beautiful area.

## Limitations of this Assessment

This watershed assessment provides useful and valuable information and represents a considerable effort of the involved agencies, contractors, and public. It was limited in duration, scope, detail, and analysis level due to constraints in budget, time, access, and overall resources. Where data are limited, hypotheses were developed to test or improve our understanding of watershed processes. Specific limitations are presented below to put the assessment in context.

- Point or more local data, e.g., individual stream reaches, were described in relation to those smaller geographical areas. As descriptions and inferences are drawn from those data to a more regional, watershed scale, the certainty associated with those conclusions and inferences is reduced.
- The CGS’s landslide and geomorphic analyses were limited to aerial photo interpretation from varying sets of photos and limited verification. Limited aerial photo coverage does not bracket temporal distribution of important watershed events, which may not be evident in photos taken years after the fact.
- Imagery from 1965 was only partly reviewed. Due to access, time, budget, and staffing constraints, field checking of interpretations did not occur.
- The geologic analysis did not identify erosion sources beyond mass wasting and gullying, such as surface erosion or erosion induced by human activities.
- At the analysis scale of 1:24,000, the detection of geologic features smaller than 100 feet in greatest diameter is poor.
- Localized point source channel aggradation and meandering flows observed shortly after the 1964 storms were not systematically compared sequentially through time to detail evolving stream channel morphology.
- The CGS’s channel classification was done based on channel gradients taken from a Digital Elevation Model. This model was based on imperfect topographic data. Most of the basin topography is mapped at a contour interval of 80 feet, which is too coarse to adequately interpret the gradient of individual reaches. No field stream gradient surveys were done for this assessment, due to time and budget constraints.
- The CGS analysis of fluvial and hillslope conditions has not been completed. Collected data are not completely converted into a digital format needed for spatial analysis. This includes the CGS’s Landslide Potential Map, fluvial geomorphic characteristics, and spatial data from NCRWQCB, CDFG, DWR, and CDF. The CGS has not reviewed all documents referenced in this report.
- There was only time to compare broad contrasts between land use impacts and habitat conditions.
- The NCRWQCBs water chemistry analysis was limited to available USEPA StoRet data for the period 1973 to 1988 at one location, and samples obtained by the NCRWQCB at four locations for two sampling events in 2001. The sampling frequency was scattered and discontinuous and did not allow for much detailed temporal analysis.
- Data on pesticide occurrences in surface water were not available from StoRet, private interests, nor collected in the NCRWQCB sampling of 2001.
- The temperature range used for proposed fully suitable of 50-60° F was developed as an average of the needs of several cold water fish species and life stages, including Chinook and coho salmon, and steelhead and cutthroat trout. As such, the range does not represent the slight variance of fully acceptable ranges for particular species.
- In-channel data and some temperature data were provided as summary statistics (medians, means, and maxima), limiting the ability to factor variability into the analysis, and not allowing for independent checks on the data quality. As such, the analyses and subsequent assessment are limited in scope.



- Temperature data analysis did not include probability of exceedance from cumulative distribution plots, nor hours of exceedance of a threshold. This analysis was limited by not having raw data for all sites, obtaining raw data late in the analysis, and data interface problems.
- The NCRWQCB did not have acceptably useful turbidity or suspended solids data, though they are considered crucial to watershed analysis. The absence of useful data and any analysis of suspended loads and turbidity are limitations in this assessment. These data sets exist, but were for one surface sampling location only and were not used in the 2002 assessment.
- Analysis of temperature information is without knowledge of the extent of a thermal reach upstream of the continuous data logger.
- Historic timber harvesting data are compiled from previous work performed by the Mattole Restoration Council. The CDF has not yet validated the accuracy of this data.
- Although the CDFG has surveyed just over 130 miles of anadromous reaches in the Mattole Basin, there are a few, most importantly Mattole Canyon Creek and unsurveyed reaches of the North Fork Mattole River, which could possibly identify opportunities for local improvements for fish. Extensive stream surveys will strengthen the stewardship effort.
- Most CDFG surveys used for this NCWAP stream reach assessment were conducted in 1996. A few surveys are more recent, while three are nearly ten years old. Although most channel characteristics remain relatively constant, components like habitat complexity and riparian shade canopy can change fairly quickly. Current surveys would contribute to data relevance and help track change to the streams in a timelier manner.
- The EMDS model used is preliminary; not all components of the model are currently in use due to data and modeling issues (i.e., stream temperature, fish passage, stream flow); not all data layers used in the model have yet been fully subjected to quality control review; scientist and practitioner peer review of the model is planned but not yet completed.

***NOTES:***